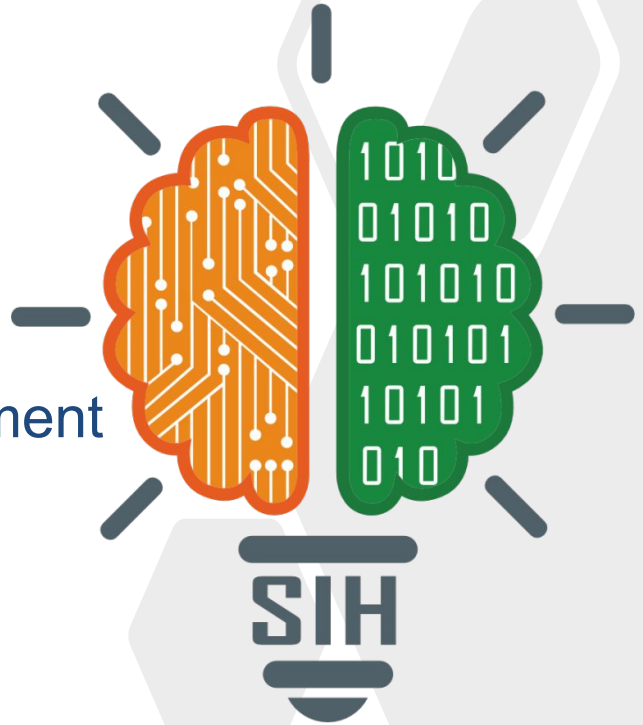
SMART INDIA HACKATHON 2025

- **Problem Statement ID –** 25074
- **Problem Statement Title-** AI-Powered Personal farming Assistant for kerala Farmers.
- **Theme-** Agriculture, Food Tech & Rural Development
- **PS Category-** Software
- **Team ID-** 100378
- **Team Name (Registered on portal)-** StarWeb



StarWeb

PROPOSED SOLUTION

SMART INDIA HACKATHON 2025

KEY FEATURES

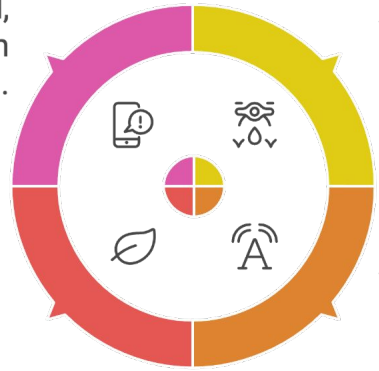
Farm and Farmer Profiling

Capture location, land, soil, crops, and irrigation details.

Personalised Advisory

AI-driven recommendations, reminders, weather & pest alerts.

.



Expert Support & Continuous Improvement

Escalation to Krishi Officers and updates using local data, expert input, and farmer feedback.

Inclusive Access

Voice/text in Malayalam, offline support, and WhatsApp/SMS for all farmers.

INNOVATION

Traditional Farming
Limited data, generic advice

Data Collection
Gathering farm data over time

Multimodal Input
Processing voice and image data

Knowledge Fusion
Combining global LLMs with local data

Continuous Learning
Refining models with feedback

AI-Enhanced Farming
Personalized, accurate, hyper-local advice

HOW IT ADDRESSES THE PROBLEM

1

Advice Tailored to Your Field

By using farmer & farm profiling (location, crop, soil, irrigation) the assistant delivers hyper-local, crop-specific recommendations instead of one-size-fits-all advisories.

2

Expert Guidance in Malayalam

A voice-first conversational interface brings agronomy to farmers in their own words and dialects, removing literacy and language barriers to adoption.

3

Evidence-backed Decisions

Activity tracking and the knowledge engine combine season-by-season farmer records with local crop calendars and pest data to produce timely, evidence-backed instructions—so actions are grounded in the farm's history and current risks.

4

Unlocks Financial Opportunity

Farmers are often invisible to banks and insurers. Our app automatically builds a credible digital record of their farm's performance, unlocking access to fair loans and insurance.

StarWeb

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

The Client Layer

It's designed for radical simplicity. Farmers interact through a **clean mobile and web app,** submitting queries using **Malayalam voice, text, or images of their crops**

- Zero learning curve design
- Full responsiveness guaranteed
- Access to dedicated alerting system.

We use **React** and **Shadcn/UI** to build a lightweight, blazing-fast, and fully responsive interface that works flawlessly even on low-end smartphones and slow networks

Data Layer

It securely manages all data, connects to the outside world, and prepares the farmer's query for the AI. It ensures our advice is not just smart, but current and relevant.

- External API integrations
- Flexible data storage
- Low-connectivity support

A secure backend built on **Node.js** and **Express.js** handles all data traffic. We integrate with external APIs for real-time weather, market prices, and pest alerts. All user data, queries, and knowledge sources are stored in **MongoDB**

AI Engine Layer

Python-powered brain using LangChain to integrate **Gemini, GPT and local AI models.** This layer enriches the query with hyper-local context to generate a truly personalized answer

- Multi-modal query analysis
- **Hyper-local data enrichment**
- Specialized AI fusion

We use **Python** as the backbone for our AI services. **LangChain** is leveraged to create powerful chains that orchestrate calls to large language models like **Gemini** and custom-trained models

Admin Layer

React-based dashboard escalates low-confidence queries to agricultural experts. Creates continuous feedback loops that retrain AI models, ensuring system learning from both data and human expertise.

- Expert quality control
- Performance monitoring
- Continuous improvement

The admin dashboard, also built in **React**, provides Agri-officers with a simple interface to view escalated cases, provide expert corrections, handle alerts and monitor system performance.

ALERTS

From the Admin Dashboard, an officer can create an **alert**—like a pest-sighting or an upcoming hailstorm

We leverage **Twilio** to instantly broadcast critical alerts via **SMS and WhatsApp**

For more detailed advisories, government scheme updates, or success stories, the admin publishes articles to a dedicated News & Alerts portal within the app

FEASIBILITY AND VIABILITY

Feasibility:

1.**Technical:** Utilizes existing technologies(web,AI).
2.**Financial:** Launch in a few regions and scale with usage.
3.**Market:** Strong need for local language advice, image diagnosis, and nearby weather/disease alerts.
4.**Operational:** Set confidence thresholds; auto-escalate low-confidence cases.

Supporting Facts

Grand View Research did a survey which suggests that the India *Farming-as-a-Service* market size is about **USD 116 million in 2024**, expected to grow to **USD 474.6 million by 2033**, at ~17.1% CAGR. Grand View Research

LinkedIn / Decadal Outlook Crop Advisory Services in India reports ~150 million farmers in India, but only about **10%** using digital advisory platforms — leaving **~90%** untapped potential. LinkedIn

Viability:

1.**Multiple revenue streams:** Subscriptions, enterprise SaaS/API deals, partner commissions, and seasonal sponsorships/ads.
2.**User base:** Millions of farmers nationwide.
3.**Scalability:** Expand coverage and features stepwise across regions, crops, languages, and channels.
4.**Long-term value:** Use historical advice, strong local knowledge, and measured outcomes to improve results and deepen loyalty.

Business Potential:

1.**Tie-ups** with fertilizer/pesticide companies, insurance providers, and financial institutions for targeted services.
2.Seasonal **brand campaigns** create high-margin revenue.
3.Integrate with state agriculture departments for **funded deployments**.
4.Aggregated farm data fuels **market intelligence services**, benefiting stakeholders across the agri-value chain.

Challenges:

1.Uncertain Answers: Some automated responses may be low confidence.
2.Language and Literacy: Many dialects and low reading ability among farmers
3.Bad connectivity: Remote areas with weak networks.
4.Trust and Adoption: Farmers may be reluctant to rely on a new tool.

Solutions:

1.Human Escalation: Route low-confidence cases to regional agronomists.
2.Voice First UX: Deliver advice via voice and local languages.
3.Low-Data Modes: Offer SMS fallbacks and resumable ploads.
4.Pilot Demonstrations: Show results on demo farms to build trust.

IMPACT AND BENEFITS

Potential impact on the target audience

Boost in crop yields:
Tailored, timely advice and early warnings improve practices and help extract more output from the same land.

Better market outcomes:
Price signals and regional trends guide when and where to sell, improving realized farmgate prices.

Stronger risk protection:
Real-time weather and disease alerts enable preventive action, avoiding major seasonal losses.

Improved financial access:
Clean digital records and consistent practices enhance creditworthiness and insurance eligibility.

Lower input costs:
Optimized fertilizer, pesticide, and water use reduces spend while preserving soil and plant health.

Benefits of the solution:

Social

Local-language, voice-first guidance widens access and inclusion.
Community alerts with clear steps enable coordinated, trusted action.

Technological

Real-time, hyperlocal alerts drive faster, proactive decisions.
Multimodal inputs with simple UX work across devices and literacy.

Economical

Timely, tailored advice boosts productivity and cuts waste.
Better planning smooths cash flows and reduces bad-season impact.

Environmental

Targeted irrigation/nutrients reduce water use and runoff.
Early detection and precise sprays lower chemical load.

Governance/Services:

Step-by-step workflows raise scheme, credit, and insurance uptake.
Logged actions create transparent records for audits and subsidies.

RESEARCH AND REFERENCES

Details / Links of the Reference and Research Work

Agriculture Data Sources

- **Telangana Agriculture Crop Master List** – Crop codes, names, and classification for Kharif & Rabi crops.
  🔗 https://www.ecostat.telangana.gov.in/Agriculture/agri_crop_list
- **mKisan Portal – USSD Structure & Codes** – Mobile-based services for farmers (USSD, SMS, IVRS, advisories, mandi prices).
  🔗 https://www.mkisan.gov.in/Alpha/aboutussdstructureandcode.aspx
- **Kerala Agricultural University – Varieties Released** – Official list of improved crop varieties (Rice, Coconut, Vegetables, Spices, Cashew, Cocoa etc.).
  🔗 https://www.kau.in/basic-page/varieties-released

AI & Research Platforms

- **Google AI for Developers** – AI/ML resources, APIs, model documentation.
  🔗 https://ai.google.dev/
- **OpenAI API** – Access to advanced AI models for NLP, chat, code, and analytics.
  🔗 https://openai.com/index/openai-api/
- **Google AI Studio** – Sandbox environment for building and testing AI solutions.
  🔗 https://aistudio.google.com/welcome

Comparison with other LLM

Features	Our Farming Assistant AI	General LLMs (GPT-4, Gemini)
Knowledge Base	Trained exclusively on agri data	limited agriculture focus
Context Awareness	Incorporates farmer location, crop, history, and seasonal trends to personalize advice.	Limited ability to recognize agriculture-specific context without extra prompting
Continuous Learning	Integrates feedback from queries, expert corrections, local events to improve each season	General LLMs improve globally, but may not access niche or local agri data quickly
Region-wise Adaptation	Tailors responses to specific districts, soil types, local crop calendars, and climate data for every region	Lacks dynamic adjustment to regional variations unless explicitly prompted each time
Farmer-Specific Guidance	Learns individual farmer's crop history, preferences, subsidy eligibility, and previous feedback, offering uniquely personalized advice	Only provides generic answers; usually ignores farmer's past history or local profile

Deployment :- https://ai-farmer-assistant-seven.vercel.app/ Github Repo: https://github.com/Arpan783808/AI-farmer-Assistant#